

## Appendices to Electronic Supplementary Material

### Crop Yield Gaps in Cameroon

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**Table S1. Stages in the development of most roots and tubers with desired traits. These are derived from interviews with agronomists at IRAD Ekona, South West Region, Cameroon.**

Stage	Activity	Goal(s)
1	Seedling nursery	Multiply seedlings from different crops that may hold the desired traits. These are done in the seedling multiplication facilities of the research centres (sometimes called the screen house).
2	Clonal evaluation	After a preliminary inspection of the phenotypic expression of viability and health of the seedlings, a selection of seedlings is identified. They become the base materials for multiplication of stocks that will be used to evaluate different traits (genetic expressions of desired qualities).
3	Preliminary yield trial	While considering all other traits, the yield parameter is evaluated. In other words, the question of the extent to which the yield parameter performs relative to other parameters is evaluated.
4	Advanced yield trials	Varieties selected from the preliminary yield trial are tested on sites with different agro-ecological conditions to be sure that the identified yield traits truly apply in the world outside the laboratory.
5	Uniform yield trials	Varieties that pass advanced yield trials are taken to and planted on farmers' farms under research-managed scenarios. Here effects of agro-ecology (the physical environment) on yields are evaluated. About two to three varieties may be retained for extension.
6	Extension	Distribution for farmers to use and feedback on farmers' use, problems, preferences, etc.

**Table S2.** Summary results of statistical analysis of unpaired t-test (two-tailed) investigating if the means of actual yields are significantly different from those of maximum attainable yield and by how much. SEM indicates standard errors of means at 95% confidence interval.

Crop	Actual Yield			Potential Yield			$R^2$	$P$ -value	Yield Gap	
	$N$	Mean (t ha <sup>-1</sup> )	SEM	$N$	Mean (t ha <sup>-1</sup> )	SEM			t ha <sup>-1</sup>	%
Roots and Tubers										
Cassava	56	8.6	0.63	36	32	2	0.75	<0.0001*	23.4	73.1
Potato	21	9	1.5	22	25	1.4	0.61	<0.0001*	16	64
Sweet potato	56	5.4	0.23	22	24	1.1	0.92	<0.0001*	18.6	77.5
Cereals										
Maize	58	2	0.06	12	6.1	0.32	0.94	<0.0001*	4.1	67.2
Rice	21	1.3	0.2	7	5.2	0.2	0.91	<0.0001*	3.9	75
Sorghum	16	0.86	0.04	12	2.3	0.15	0.87	<0.0001*	1.44	62.6
Legumes										
Bean	48	1.3	0.03	16	1.4	0.09	0.02	0.49	0.1	7.1
Groundnuts	57	1.2	0.06	18	2.9	0.09	0.86	<0.0001*	1.7	58.6

\* Indicate means that are significantly different (*P* < 0.05)

**Table S3. Crop-specific and soil-specific values used in the crop suitability modelling**

**a) Crop-specific values implemented for different datasets in the crop suitability modelling**

Crops	SMSC (mm m <sup>-3</sup> )	pH (-log[H <sup>+</sup> ])	Soil Texture (class)	Soil Depth (m)	Temperature (°C)		Rain (mm)	LGP (days)	Altitude (masl)	Slope (%)
					Absolute	Optimum				
Bean	120 – 180*	4.2 - 8.7	M*	1.0	10 - 30	15 - 19 <sup>‡</sup>	500 – 1000*	90 - 120	500 - 2100	0 - 8
Groundnut	50 - 120 <sup>‡</sup>	5.5 - 6.5	L*	1.8	10 - 45	22 – 32 <sup>‡</sup>	1000 - 1500 <sup>‡</sup>	90 - 140	10 - 1800	0 – 8*
Maize	120 – 180 <sup>‡</sup>	5.5 - 7.5	M <sup>‡</sup>	2.0*	10 - 47	18 - 33 <sup>‡</sup>	700 – 1200*	100 - 140	10 - 2000	0 - 8
Rice	180 – 300*	5.5 - 7.0	M – H*	1.0	16 - 38	25 - 35 <sup>‡</sup>	1500 – 2000*	90 - 150	10 - 2000	0 – 2*
Sorghum	120 - 180 <sup>‡</sup>	5.5 - 7.5	M - H <sup>‡</sup>	1.5*	8 - 40	27 - 35 <sup>‡</sup>	600 - 1000 <sup>‡</sup>	100 - 140	600 - 1500	0 - 4 <sup>‡</sup>
Cassava	50 - 120 <sup>‡</sup>	5.5 - 8.0	M - L <sup>‡</sup>	2.0*	10 - 35	20 – 29*	1000 – 2100*	180 - 365	0 - 400	0 – 4*
Potato	120 - 180 <sup>‡</sup>	5.0 - 6.5	L*	0.6	7 - 30	15 – 25*	500 – 800*	90 - 160	700 - 2000	0 – 8*
Sweet potato	120 - 180 <sup>‡</sup>	5.5 - 6.2	M*	1.8	10 - 38	18 – 28*	750 - 1300 <sup>‡</sup>	80 - 170	10 - 1000	0 - 12 <sup>‡</sup>

SMSC = Soil moisture storage capacity. Soil texture class definitions: L = Light; M = Medium; H = Heavy. Also refer to Table 1 for other dataset characteristics. \* = Factor of high importance; <sup>‡</sup> = Factor of Medium importance. pH and LGP were considered important for all crops. Altitude and the rest of the unmarked variables for individual crops were considered of low importance. Note: A 2012 version of Derived Soil Properties dataset by the same authors show no significant difference for the soil properties used for Cameroon. Source: Adapted from Landon (1984); Bowen and Hollinger (2002); Kowal and Kassam (1978).

**b) Ratings of soil-specific values implemented for different datasets (from Landon, 1984)**

CEC (meq 100 g <sup>-1</sup> )	Soil N (%)	Organic C (%)	Rating
>40	>1.0	>20	Very high
25 – 40	0.5 – 1.0	10 – 20	High
15 – 25	0.2 – 0.5	4 – 10	Medium
5 – 15	0.1 – 0.2	2 – 4	Low
<5	<0.1	<2	Very low